

## CLAIMS

## What is claimed is:

1. A method of preparing a titania composite membrane for separating  
5 water/alcohol mixtures, the method comprising the steps of:
  - (a) modifying macropores of a porous support by sequentially treating the macropores with silica xerogel and  $\gamma$ -alumina sol in this order;
  - (b) forming a titania surface layer according to a sol-gel process by coating said modified porous surface with titania sol; and
  - 10 (c) drying said membrane at 20-30 °C and relative humidity of 50-70% followed by calcining said membrane at 250-400 °C.
2. The method of claim 1, wherein said porous support is a porous metal support having a pore size of 1-5  $\mu\text{m}$ .
- 15 3. The method of claim 1, wherein the step (a) comprises a first modification of the macropores of said porous support by packing silica xerogel with a press and a second modification of the surface with  $\gamma$ -alumina sol according to a soaking-rolling process.
- 20 4. The method of claim 1, wherein said titania sol is prepared by refluxing titanium tetraalkoxide in a mixture of water, alcohol and hydrochloric acid.
5. The method of claim 1, wherein the step (b) is performed by coating the modified  
25 surface with titania sol according to a soaking-rolling process.
6. The titania composite membrane for separating water/alcohol mixtures prepared

according to any of claims 1-5, wherein said membrane has a pore size of 1-2 nm, a surface area of 300-350 m<sup>2</sup>/g, a permeability for water of 25-520 g/m<sup>2</sup>·h and a selectivity for water of 1-400 in water/alcohol mixtures at 250 °C.

- 5    7. The membrane of claim 6, wherein said permeability for water is 25-420g/m<sup>2</sup>·h and said selectivity for water is 10-140 in water/ethanol mixtures at 250 °C.
8. The membrane of claim 6, wherein said permeability for water is 50-520g/m<sup>2</sup>·h and said selectivity for water of 30-400 in water/propanol mixtures at 250 °C.